

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : FURUKAWA CO LTD

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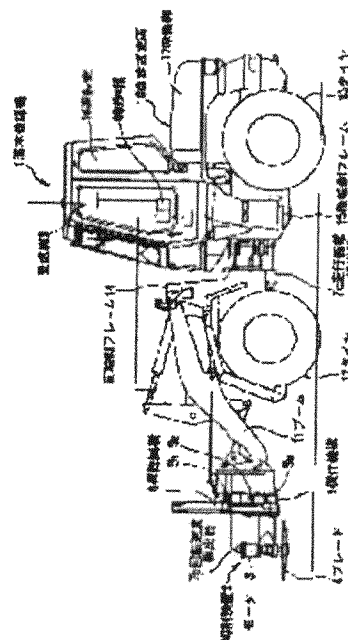
(72)Inventor : KAWACHI AKIRA

(54) BUSH CUTTER

(57)Abstract:

PROBLEM TO BE SOLVED: To safely perform a bush cutting work at a dangerous place by remotely controlling a bush cutter.

SOLUTION: The bush cutter 1 having a cutting apparatus 2 in front of a self-traveling vehicle 10 is provided with a lateral traversing mechanism 5 to laterally move the cutting apparatus 2, a lifting mechanism 6 to vertically move the cutting apparatus 2, a position detector 7a to detect the position of the cutting apparatus 2, a rotating speed detector 7b to detect the rotating speed of the cutting apparatus 2, a traveled distance detector 7c to detect the traveled distance of the self-traveling vehicle 10, a receiver 9 to receive the operation signal transmitted by a transmitter distant from the self-traveling vehicle 10 and a controller 8 to control the actions of the lateral traversing mechanism 5, the lifting mechanism 6, the cutting apparatus 2 and the traveling apparatus of the self-traveling vehicle 10 based on the data detected by the detectors 7a, 7b, 7c and operation signal received by the receiver 9.



LEGAL STATUS

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CLAIMS

[Claim(s)]

[Claim 1] The infestation device in which are the arboret tree trimming machine equipped with cut equipment ahead of the self-propelled car, and cut equipment is moved to a longitudinal direction, The elevator style which moves cut equipment in the vertical direction, and the position transducer which detects the location of cut equipment, The rotational-speed detector which detects the rotational speed of cut equipment, and the mileage detector which detects the mileage of a self-propelled car, The receiver which receives the manipulate signal transmitted from the location distant from the self-propelled car, The arboret tree trimming machine characterized by forming the controller which controls actuation of an infestation device, an elevator style, cut equipment, and the traveller of a self-propelled car based on the manipulate signal received by each detection data and the receiver of a position transducer, a rotational-speed detector, and a mileage detector.

[Claim 2] The arboret tree trimming machine according to claim 1 characterized by having the inquiry equipment which investigates the laying-under-the-ground mine with which it was equipped behind cut equipment, and the inquiry data transmitter which transmits inquiry data to the location distant from the self-propelled car.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the arboret tree trimming machine for cutting down the arboret which grew thick in a dangerous location like for example, mine Hara.

[0002]

[Description of the Prior Art] Conventionally, the activity which removes the mine laid underground in the earth has been done in the procedure of investigating a laying-under-the-ground mine with a probe, and carrying out blasting processing of the detected mine with a help. However, it was covered with arboret with the great portion of deep mine Hara, and since inquiry by the probe was difficult, it was required, when mine Hara was in a tropical rain forestry area band to cut down arboret first. However, tree trimming of the arboret in mine [that a mine is laid underground] Hara has the failure of harmful animals and plants, such as a mosquito and a thorn, in addition to a mine, when accompanied by risk, and tree trimming is very difficult.

[0003] Then, the mounting beam arboret tree trimming machine is proposed in the rotary cutter at the head of the arm which is used with excavators, such as a back hoe, in recent years and in which boom hoisting and refraction are free (refer to JP,8-320199,A and JP,11-183095,A).

[0004]

[Problem(s) to be Solved by the Invention] However, since the arm in which boom hoisting and refraction are free is used for this arboret tree trimming machine, while a complicated motion of a rotary cutter is possible for it, if it is going to operate this by remote control, control becomes complicated and remote operation is difficult. Therefore, an operator needs to get into [a car] and needs to operate it.

[0005] Since such an arboret tree trimming machine is used before it investigates a laying-under-the-ground mine, a possibility of touching the antitank mine which has not only the small anti-personnel mine of explosive power but intense explosive power is size, and it is very dangerous with mine Hara for the operator who has boarded. This invention solves the above-mentioned problem in the conventional arboret tree trimming machine, and aims at offering the arboret tree trimming machine which can be easily operated by remote control from the distant location.

[0006]

[Means for Solving the Problem] The infestation device in which the arboret tree trimming machine of this invention is an arboret tree trimming machine equipped with cut equipment ahead of the self-propelled car, and cut equipment is moved to a longitudinal direction, The elevator style which moves cut equipment in the vertical direction, and the position transducer which detects the location of cut equipment, The rotational-speed detector which detects the rotational speed of cut equipment, and the mileage detector which detects the mileage of a self-propelled car, The receiver which receives the manipulate signal transmitted from the location distant from the self-propelled car, The above-mentioned technical problem is solved by forming the controller which controls actuation of an infestation device, an elevator style, cut equipment, and the traveller of a self-propelled car based on the manipulate signal received by each detection data and the receiver of a position transducer, a rotational-

speed detector, and a mileage detector.

[0007] In doing an arboret tree trimming activity in dangerous locations, such as mine Hara, it sends the manipulate signal of actuation initiation from the safe location distant from the arboret tree trimming machine. Then, a controller makes actuation of an arboret tree trimming machine start based on the manipulate signal received by the receiver. During an activity, a position transducer detects the location of cut equipment and a rotational-speed detector detects the rotational speed of cut equipment. A mileage detector detects the mileage of a self-propelled car. A controller A position transducer, Arboret is cut down controlling actuation of an elevator style, an infestation device, cut equipment, and the traveller of a self-propelled car, continuing and moving cut equipment to predetermined tree trimming width of face ahead [of a self-propelled car] based on each detection data of a rotational-speed detector and a mileage detector, and advancing a self-propelled car.

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[0008] That is, in the manipulate signal of actuation initiation, a carrier beam control unit operates an elevator style first, and cut equipment is set to predetermined height. Next, the cutter of cut equipment is rotated and cut equipment is made to overrun according to an infestation device. When cut equipment moves to a right end or a left end, predetermined distance advance of the automotive vehicle is carried out, and cut equipment is made to overrun to hard flow. If arboret tree trimming of the required range is completed and the manipulate signal of an actuation halt will be sent from the safe location distant from the arboret tree trimming machine, based on the manipulate signal received by the receiver, a controller will stop actuation of an arboret tree trimming machine.

[0009] This arboret tree trimming machine is simple for the control at the time of remote operation, and an operator can do an arboret tree trimming activity only by sending the manipulate signal of actuation initiation and an actuation halt from a safe location. It equips with the inquiry equipment which investigates a laying-under-the-ground mine behind cut equipment, and if the inquiry data transmitter which transmits inquiry data to the location distant from the self-propelled car is formed, since an arboret tree trimming machine can be used after arboret tree trimming and a laying-under-the-ground mine can be investigated, a mine-disposal activity will also become easy.

[0010]

[Embodiment of the Invention] The side elevation of the arboret tree trimming machine which drawing 1 shows one gestalt of operation of this invention, the top view in which drawing 2 shows the activity range of an arboret tree trimming machine, the block diagram in which drawing 3 shows the configuration of a controller, and drawing 4 are the flow charts showing the work habits of an arboret tree trimming machine. Here, the body of the arboret tree trimming machine 1 is the self-propelled car 10 of the articulated type which connected with right and left the front-wheel side frame 14 which formed the tire 12, and the rear wheel side frame 15 which formed the tire 13 turnable in the center section, the boom 11 which can rise and fall is formed in that front-wheel side frame 14, and cut equipment 2 is attached in the point of this boom 11. The driver's cabin 16 and the motor unit 17 are formed in the rear wheel side frame 15. In addition, cars of other formats, such as a crawler type, can also be used for a self-propelled car.

[0011] Cut equipment 2 consists of a motor 3 which is a revolution drive, and a blade 4 with which the motor 3 was connected and equipped, is supported by the point of a boom 11 through the infestation device 5 and the elevator style 6, and is movable in the longitudinal direction and the vertical direction. As a cutter of cut equipment 2, although the blade 4 is used here, cutters of other formats, such as a chain saw, can also be used according to the object to cut down.

[0012] The infestation device 5 and the elevator style 6 are constituted so that cut equipment 2 may be made to slide in a longitudinal direction and the vertical direction by the oil hydraulic cylinder which is not illustrated. The oil hydraulic cylinder of the infestation device 5 is controlled by the solenoid valve switched by the right slide solenoid 51 and the left slide solenoid 52, and the oil hydraulic cylinder of the elevator style 6 is controlled by the solenoid valve switched by the top slide solenoid 61 and the float solenoid 62. A motor 3 is controlled by the solenoid valve switched by the motor right rotational motion solenoid 31 and the motor RLC solenoid 32. The traveller of a self-propelled car is controlled by the solenoid valve switched by the solenoid 41 for advance, and the solenoid 42 for go-astern.

[0013] In addition, it can replace with an oil hydraulic cylinder and a pneumatic cylinder, an electric motor, etc. can also be used for the driving means of the infestation device 5 and the elevator style 6. Position-transducer 7a for detecting the location of cut equipment 2 is prepared in the infestation device 5 and the elevator style 6. This position-transducer 7a is proximity switch S4 arranged at the infestation device 5 so that the proximity switch S1 arranged at the elevator style 6 so that the upper bed of cut equipment 2, assignment cut height, and a soffit may be detected, S2, S3, the left end of cut equipment 2, and a right end may be detected, and S5. It is constituted. In addition, other sensors, such as a limit switch besides a proximity switch, a rotary encoder, and a potentiometer, can also be used for a position transducer 7.

[0014] Rotational-speed detector 7b for detecting the rotational speed of a blade 4 is prepared in cut equipment 2. This rotational-speed detector 7b consists of revolution sensors which change the rotational speed of a motor 3 into an electrical signal. Mileage detector 7c for detecting mileage is prepared in the self-propelled car 10. This mileage detector 7c consists of revolution sensors which change the rotational speed of a mission output shaft into an electrical signal.

[0015] The receiver 9 which receives the manipulate signal transmitted to this arboret tree trimming machine 1 from the location distant from the self-propelled car 10, and the controller 8 which controls actuation of the traveller of cut equipment 2, the infestation device 5, the elevator style 6, and the self-propelled car 10 are formed, and the manipulate signal received by each detection data and the receiver 9 of position-transducer 7a, rotational-speed detector 7b, and mileage detector 7c is sent to this controller 8.

[0016] A controller 8 is the microprocessing unit (MPU) equipped with the input section 81, the data-processing section 82, the storage section 83, and the output section 84, as shown in drawing 3. It is based on the detection data of a manipulate signal and a position transducer 7 received by the receiver 9. A control signal is sent to the motor RRC solenoid 31, the motor RLC solenoid 32, the right slide solenoid 51, the left slide solenoid 52, the top slide solenoid 61, the bottom slide solenoid 62, the solenoid 41 for advance, and the solenoid 42 for go-astern. The actuation is controlled by switching the solenoid valve (graphic display abbreviation) of the traveller of a motor 3, the infestation device 5, the elevator style 6, and the self-propelled car 10.

[0017] Drawing 4 explains work habits in case the arboret tree trimming machine 1 performs arboret tree trimming of mine Hara. First, the manipulate signal of actuation initiation is sent using a remote-operation machine (graphic display abbreviation) from the safe location where damage does not attain to the body by explosion of a mine. Then, the manipulate signal received by the receiver 9 is sent to a controller 8. a controller 8 has the location of cut equipment 2 in a left end -- proximity switch S4 from -- when a signal is on, it checks. When there is nothing at a left end, on signal is outputted to the left slide solenoid 52 from a controller 8, and cut equipment 2 is moved to a left end.

[0018] next, the thing which a controller 8 is in the assignment cut height to which the location of cut equipment 2 was set beforehand -- proximity switch S2 from -- when a signal is on, it checks. When there is no cut equipment 2 in assignment cut height, on signal is outputted to the bottom slide solenoid 62 from a controller 8, and cut equipment 2 is moved caudad. The cut equipment 2 which moved caudad when cut equipment 2 was in the location higher than assignment cut height reaches assignment cut height, and is a proximity switch S2. It is set to being turned on. A soffit arrives at and the cut equipment 2 which moved caudad when cut equipment 2 was in the location lower than assignment cut height is a proximity switch S3. It is set to being turned on and it is off from a controller 8 to a bottom slide solenoid 62. While outputting a signal, on signal is outputted to the top slide solenoid 62, cut equipment 2 is moved up, it is **, cut equipment 2 reaches to assignment cut height, and it is a proximity switch S2. It is set to being turned on.

[0019] Proximity switch S2 If turned on, it is off to the bottom slide solenoid 62 or the top slide solenoid 62. A signal is sent, and cut equipment 2 stops in assignment cut height, and is held in the height. And a controller 8 outputs on signal to the motor RRC solenoid 31, and carries out the RRC of the motor 3 of cut equipment 2. Upper limit rotational speed N1 to which motor rotational speed was set beforehand If it becomes above, since rotational-speed detector 7b will be set to being turned on and a controller 8 will

output on signal to the right slide solenoid 51, cut equipment 2 moves to right-hand side, cutting down arboret by the revolution of a blade 4.

[0020] Minimum rotational speed N2 to which motor rotational speed was beforehand set by cutting force. If it becomes below, rotational-speed detector 7b is off. Becoming, a controller 8 is off to the right slide solenoid 51. Since a signal is outputted, migration on the right-hand side of cut equipment 2 stops. If migration on right-hand side stops, since cutting force is lost, rotational speed will increase. It is the upper limit rotational speed N1 again. If it becomes the above, since rotational-speed detector 7b will be again set to being turned on and a controller 8 will output on signal to the right slide solenoid 51, cut equipment 2 resumes migration on right-hand side.

[0021] When cut equipment 2 arrives at a right end, it is a proximity switch S5. It is set to being turned on and a controller 8 is off to the right slide solenoid 51. While outputting a signal, it is off to the motor RRC solenoid 31. A signal is outputted and on signal is outputted to the motor RLC solenoid 32. The inversion of a motor 3 is performed by satisfactory revolution on reinforcement. Motor rotational speed is the upper limit rotational speed N1. If it becomes above, since rotational-speed detector 7b will be set to being turned on and a controller 8 will output on signal to the solenoid 41 for advance, the self-propelled car 10 moves forward cutting down arboret by the revolution of the blade 4 of cut equipment 2. It is the same as that of the case of migration on right-hand side to repeat advance and a halt by change of the rotational speed of a motor 3.

[0022] If it runs only the distance set up beforehand, mileage detector 7c is set to being turned on, and a controller 8 is off to the solenoid 41 for advance. Since a signal is outputted, the self-propelled car 10 suspends advance. Motor rotational speed is the upper limit rotational speed N1. If it becomes above, since rotational-speed detector 7b will be set to being turned on and a controller 8 will output on signal to the left slide solenoid 52, cut equipment 2 moves to left-hand side, cutting down arboret by the revolution of a blade 4.

[0023] If cut equipment 2 arrives at a left end, after advancing the self-propelled car 10 like the case of a right end, the above-mentioned activity will be repeated again. Thus, the arboret tree trimming machine 1 can perform automatically tree trimming of the arboret in the arboret tree trimming range A. If arboret tree trimming is completed and the manipulate signal of an actuation halt will be sent using a remote-operation machine from the safe location distant from the arboret tree trimming machine 1, based on the manipulate signal received by the receiver 9, a controller 8 will stop actuation of the arboret tree trimming machine 1.

[0024] Here, at the time of right translation, at the time of a RRC and left translation, it is constituted so that it may be made into a RRC at the time of a RLC and left end advance at the time of a RLC and right end advance, but since there is a possibility of calling in a mine in the direction of the self-propelled car 10 when using it in mine Hara, a hand of cut may be conversely constituted, so that the hand of cut of a motor 3 may draw arboret near to the travelling direction of a blade 4.

[0025] The side elevation of the cut equipment part of the arboret tree trimming machine which drawing 5 shows the gestalt of other operations of this invention, and drawing 6 are the explanatory views of the condition at the time of a mine inquiry activity. It is equipped with the inquiry equipment 18 which investigates a laying-under-the-ground mine behind the cut equipment 2 of this arboret tree trimming machine 1, and the inquiry data transmitter 19 which transmits that inquiry data to the location distant from the self-propelled car 10 is formed in the upper bed section of the elevator style 6.

[0026] Inquiry equipment 18 consists of detection section 18a, defense box 18b for containing and defending detection section 18a, and receipt device 18c for moving detection section 18a from an inquiry location to a stowed position. Since a mine can be efficiently investigated by this arboret tree trimming machine's 1 making an inquiry location detection section 18a of inquiry equipment 18 after arboret tree trimming as shown in drawing 6, and making cut equipment 2 overrun, and making it run the self-propelled car 10 on mine Hara, a mine-disposal activity also becomes easy.

[0027]

[Effect of the Invention] As explained above, control is automated, and since the arboret tree trimming machine of this invention can be easily operated by remote control from the distant location, it can do an

arboret tree trimming activity [in dangerous locations, such as mine Hara,] on insurance. Moreover, it equips with the inquiry equipment which investigates a laying-under-the-ground mine behind cut equipment, and if the inquiry data transmitter which transmits inquiry data to the location distant from the self-propelled car is formed, since an arboret tree trimming machine can be used and remote operation can also perform inquiry of a laying-under-the-ground mine safely after arboret tree trimming, a mine-disposal activity becomes easy.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the arboret tree trimming machine for cutting down the arboret which grew thick in a dangerous location like for example, mine Hara.

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PRIOR ART

[Description of the Prior Art] Conventionally, the activity which removes the mine laid underground in the earth has been done in the procedure of investigating a laying-under-the-ground mine with a probe, and carrying out blasting processing of the detected mine with a help. However, it was covered with arboret with the great portion of deep mine Hara, and since inquiry by the probe was difficult, it was required, when mine Hara was in a tropical rain forestry area band to cut down arboret first. However, tree trimming of the arboret in mine [that a mine is laid underground] Hara has the failure of harmful animals and plants, such as a mosquito and a thorn, in addition to a mine, when accompanied by risk, and tree trimming is very difficult.

[0003] Then, the mounting beam arboret tree trimming machine is proposed in the rotary cutter at the head of the arm which is used with excavators, such as a back hoe, in recent years and in which boom hoisting and refraction are free (refer to JP,8-320199,A and JP,11-183095,A).

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, control is automated, and since the arboret tree trimming machine of this invention can be easily operated by remote control from the distant location, it can do an arboret tree trimming activity [in dangerous locations, such as mine Hara,] on insurance. Moreover, it equips with the inquiry equipment which investigates a laying-under-the-ground mine behind cut equipment, and if the inquiry data transmitter which transmits inquiry data to the location distant from the self-propelled car is formed, since an arboret tree trimming machine can be used and remote operation can also perform inquiry of a laying-under-the-ground mine safely after arboret tree trimming, a mine-disposal activity becomes easy.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since the arm in which boom hoisting and refraction are free is used for this arboret tree trimming machine, while a complicated motion of a rotary cutter is possible for it, if it is going to operate this by remote control, control becomes complicated and remote operation is difficult. Therefore, an operator needs to get into [a car] and needs to operate it. [0005] Since such an arboret tree trimming machine is used before it investigates a laying-under-the-ground mine, a possibility of touching the antitank mine which has not only the small anti-personnel mine of explosive power but intense explosive power is size, and it is very dangerous with mine Hara for the operator who has boarded. This invention solves the above-mentioned problem in the conventional arboret tree trimming machine, and aims at offering the arboret tree trimming machine which can be easily operated by remote control from the distant location.

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MEANS

[Means for Solving the Problem] The infestation device in which the arboret tree trimming machine of this invention is an arboret tree trimming machine equipped with cut equipment ahead of the self-propelled car, and cut equipment is moved to a longitudinal direction, The elevator style which moves cut equipment in the vertical direction, and the position transducer which detects the location of cut equipment, The rotational-speed detector which detects the rotational speed of cut equipment, and the mileage detector which detects the mileage of a self-propelled car, The receiver which receives the manipulate signal transmitted from the location distant from the self-propelled car, The above-mentioned technical problem is solved by forming the controller which controls actuation of an infestation device, an elevator style, cut equipment, and the traveller of a self-propelled car based on the manipulate signal received by each detection data and the receiver of a position transducer, a rotational-speed detector, and a mileage detector.

[0007] In doing an arboret tree trimming activity in dangerous locations, such as mine Hara, it sends the manipulate signal of actuation initiation from the safe location distant from the arboret tree trimming machine. Then, a controller makes actuation of an arboret tree trimming machine start based on the manipulate signal received by the receiver. During an activity, a position transducer detects the location of cut equipment and a rotational-speed detector detects the rotational speed of cut equipment. A mileage detector detects the mileage of a self-propelled car. A controller A position transducer, Arboret is cut down controlling actuation of an elevator style, an infestation device, cut equipment, and the traveller of a self-propelled car, continuing and moving cut equipment to predetermined tree trimming width of face ahead [of a self-propelled car] based on each detection data of a rotational-speed detector and a mileage detector, and advancing a self-propelled car.

[0008] That is, in the manipulate signal of actuation initiation, a carrier beam control unit operates an elevator style first, and cut equipment is set to predetermined height. Next, the cutter of cut equipment is rotated and cut equipment is made to overrun according to an infestation device. When cut equipment moves to a right end or a left end, predetermined distance advance of the automotive vehicle is carried out, and cut equipment is made to overrun to hard flow. If arboret tree trimming of the required range is completed and the manipulate signal of an actuation halt will be sent from the safe location distant from the arboret tree trimming machine, based on the manipulate signal received by the receiver, a controller will stop actuation of an arboret tree trimming machine.

[0009] This arboret tree trimming machine is simple for the control at the time of remote operation, and an operator can do an arboret tree trimming activity only by sending the manipulate signal of actuation initiation and an actuation halt from a safe location. It equips with the inquiry equipment which investigates a laying-under-the-ground mine behind cut equipment, and if the inquiry data transmitter which transmits inquiry data to the location distant from the self-propelled car is formed, since an arboret tree trimming machine can be used after arboret tree trimming and a laying-under-the-ground mine can be investigated, a mine-disposal activity will also become easy.

[0010]

[Embodiment of the Invention] The side elevation of the arboret tree trimming machine which drawing

1 shows one gestalt of operation of this invention, the top view in which drawing 2 shows the activity range of an arboret tree trimming machine, the block diagram in which drawing 3 shows the configuration of a controller, and drawing 4 are the flow charts showing the work habits of an arboret tree trimming machine. Here, the body of the arboret tree trimming machine 1 is the self-propelled car 10 of the articulated type which connected with right and left the front-wheel side frame 14 which formed the tire 12, and the rear wheel side frame 15 which formed the tire 13 turnable in the center section, the boom 11 which can rise and fall is formed in that front-wheel side frame 14, and cut equipment 2 is attached in the point of this boom 11. The driver's cabin 16 and the motor unit 17 are formed in the rear wheel side frame 15. In addition, cars of other formats, such as a crawler type, can also be used for a self-propelled car.

[0011] Cut equipment 2 consists of a motor 3 which is a revolution drive, and a blade 4 with which the motor 3 was connected and equipped, is supported by the point of a boom 11 through the infestation device 5 and the elevator style 6, and is movable in the longitudinal direction and the vertical direction. As a cutter of cut equipment 2, although the blade 4 is used here, cutters of other formats, such as a chain saw, can also be used according to the object to cut down.

[0012] The infestation device 5 and the elevator style 6 are constituted so that cut equipment 2 may be made to slide in a longitudinal direction and the vertical direction by the oil hydraulic cylinder which is not illustrated. The oil hydraulic cylinder of the infestation device 5 is controlled by the solenoid valve switched by the right slide solenoid 51 and the left slide solenoid 52, and the oil hydraulic cylinder of the elevator style 6 is controlled by the solenoid valve switched by the top slide solenoid 61 and the float solenoid 62. A motor 3 is controlled by the solenoid valve switched by the motor right rotational motion solenoid 31 and the motor RLC solenoid 32. The traveller of a self-propelled car is controlled by the solenoid valve switched by the solenoid 41 for advance, and the solenoid 42 for go-astern.

[0013] In addition, it can replace with an oil hydraulic cylinder and a pneumatic cylinder, an electric motor, etc. can also be used for the driving means of the infestation device 5 and the elevator style 6. Position-transducer 7a for detecting the location of cut equipment 2 is prepared in the infestation device 5 and the elevator style 6. This position-transducer 7a is proximity switch S4 arranged at the infestation device 5 so that the proximity switch S1 arranged at the elevator style 6 so that the upper bed of cut equipment 2, assignment cut height, and a soffit may be detected, S2, S3, the left end of cut equipment 2, and a right end may be detected, and S5. It is constituted. In addition, other sensors, such as a limit switch besides a proximity switch, a rotary encoder, and a potentiometer, can also be used for a position transducer 7.

[0014] Rotational-speed detector 7b for detecting the rotational speed of a blade 4 is prepared in cut equipment 2. This rotational-speed detector 7b consists of revolution sensors which change the rotational speed of a motor 3 into an electrical signal. Mileage detector 7c for detecting mileage is prepared in the self-propelled car 10. This mileage detector 7c consists of revolution sensors which change the rotational speed of a mission output shaft into an electrical signal.

[0015] The receiver 9 which receives the manipulate signal transmitted to this arboret tree trimming machine 1 from the location distant from the self-propelled car 10, and the controller 8 which controls actuation of the traveller of cut equipment 2, the infestation device 5, the elevator style 6, and the self-propelled car 10 are formed, and the manipulate signal received by each detection data and the receiver 9 of position-transducer 7a, rotational-speed detector 7b, and mileage detector 7c is sent to this controller 8.

[0016] A controller 8 is the microprocessing unit (MPU) equipped with the input section 81, the data-processing section 82, the storage section 83, and the output section 84, as shown in drawing 3. It is based on the detection data of a manipulate signal and a position transducer 7 received by the receiver 9. A control signal is sent to the motor RRC solenoid 31, the motor RLC solenoid 32, the right slide solenoid 51, the left slide solenoid 52, the top slide solenoid 61, the bottom slide solenoid 62, the solenoid 41 for advance, and the solenoid 42 for go-astern. The actuation is controlled by switching the solenoid valve (graphic display abbreviation) of the traveller of a motor 3, the infestation device 5, the elevator style 6, and the self-propelled car 10.

- [0017] Drawing 4 explains work habits in case the arboret tree trimming machine 1 performs arboret tree trimming of mine Hara. First, the manipulate signal of actuation initiation is sent using a remote-operation machine (graphic display abbreviation) from the safe location where damage does not attain to the body by explosion of a mine. Then, the manipulate signal received by the receiver 9 is sent to a controller 8. a controller 8 has the location of cut equipment 2 in a left end -- proximity switch S4 from - when a signal is on, it checks. When there is nothing at a left end, on signal is outputted to the left slide solenoid 52 from a controller 8, and cut equipment 2 is moved to a left end.
- [0018] next, the thing which a controller 8 is in the assignment cut height to which the location of cut equipment 2 was set beforehand -- proximity switch S2 from -- when a signal is on, it checks. When there is no cut equipment 2 in assignment cut height, on signal is outputted to the bottom slide solenoid 62 from a controller 8, and cut equipment 2 is moved caudad. The cut equipment 2 which moved caudad when cut equipment 2 was in the location higher than assignment cut height reaches assignment cut height, and is a proximity switch S2. It is set to being turned on. A soffit arrives at and the cut equipment 2 which moved caudad when cut equipment 2 was in the location lower than assignment cut height is a proximity switch S3. It is set to being turned on and it is off from a controller 8 to a bottom slide solenoid 62. While outputting a signal, on signal is outputted to the top slide solenoid 62, cut equipment 2 is moved up, it is **, cut equipment 2 reaches to assignment cut height, and it is a proximity switch S2. It is set to being turned on.
- [0019] Proximity switch S2 If turned on, it is off to the bottom slide solenoid 62 or the top slide solenoid 62. A signal is sent, and cut equipment 2 stops in assignment cut height, and is held in the height. And a controller 8 outputs on signal to the motor RRC solenoid 31, and carries out the RRC of the motor 3 of cut equipment 2. Upper limit rotational speed N1 to which motor rotational speed was set beforehand If it becomes above, since rotational-speed detector 7b will be set to being turned on and a controller 8 will output on signal to the right slide solenoid 51, cut equipment 2 moves to right-hand side, cutting down arboret by the revolution of a blade 4.
- [0020] Minimum rotational speed N2 to which motor rotational speed was beforehand set by cutting force If it becomes below, rotational-speed detector 7b is off. Becoming, a controller 8 is off to the right slide solenoid 51. Since a signal is outputted, migration on the right-hand side of cut equipment 2 stops. If migration on right-hand side stops, since cutting force is lost, rotational speed will increase. It is the upper limit rotational speed N1 again. If it becomes the above, since rotational-speed detector 7b will be again set to being turned on and a controller 8 will output on signal to the right slide solenoid 51, cut equipment 2 resumes migration on right-hand side.
- [0021] When cut equipment 2 arrives at a right end, it is a proximity switch S5. It is set to being turned on and a controller 8 is off to the right slide solenoid 51. While outputting a signal, it is off to the motor RRC solenoid 31. A signal is outputted and on signal is outputted to the motor RLC solenoid 32. The inversion of a motor 3 is performed by satisfactory revolution on reinforcement. Motor rotational speed is the upper limit rotational speed N1. If it becomes above, since rotational-speed detector 7b will be set to being turned on and a controller 8 will output on signal to the solenoid 41 for advance, the self-propelled car 10 moves forward cutting down arboret by the revolution of the blade 4 of cut equipment 2. It is the same as that of the case of migration on right-hand side to repeat advance and a halt by change of the rotational speed of a motor 3.
- [0022] If it runs only the distance set up beforehand, mileage detector 7c is set to being turned on, and a controller 8 is off to the solenoid 41 for advance. Since a signal is outputted, the self-propelled car 10 suspends advance. Motor rotational speed is the upper limit rotational speed N1. If it becomes above, since rotational-speed detector 7b will be set to being turned on and a controller 8 will output on signal to the left slide solenoid 52, cut equipment 2 moves to left-hand side, cutting down arboret by the revolution of a blade 4.
- [0023] If cut equipment 2 arrives at a left end, after advancing the self-propelled car 10 like the case of a right end, the above-mentioned activity will be repeated again. Thus, the arboret tree trimming machine 1 can perform automatically tree trimming of the arboret in the arboret tree trimming range A. If arboret tree trimming is completed and the manipulate signal of an actuation halt will be sent using a remote-

operation machine from the safe location distant from the arboret tree trimming machine 1, based on the manipulate signal received by the receiver 9, a controller 8 will stop actuation of the arboret tree trimming machine 1.

[0024] Here, at the time of right translation, at the time of a RRC and left translation, it is constituted so that it may be made into a RRC at the time of a RLC and left end advance at the time of a RLC and right end advance, but since there is a possibility of calling in a mine in the direction of the self-propelled car 10 when using it in mine Hara, a hand of cut may be conversely constituted, so that the hand of cut of a motor 3 may draw arboret near to the travelling direction of a blade 4.

[0025] The side elevation of the cut equipment part of the arboret tree trimming machine which drawing 5 shows the gestalt of other operations of this invention, and drawing 6 are the explanatory views of the condition at the time of a mine inquiry activity. It is equipped with the inquiry equipment 18 which investigates a laying-under-the-ground mine behind the cut equipment 2 of this arboret tree trimming machine 1, and the inquiry data transmitter 19 which transmits that inquiry data to the location distant from the self-propelled car 10 is formed in the upper bed section of the elevator style 6.

[0026] Inquiry equipment 18 consists of detection section 18a, defense box 18b for containing and defending detection section 18a, and receipt device 18c for moving detection section 18a from an inquiry location to a stowed position. Since a mine can be efficiently investigated by this arboret tree trimming machine's 1 making an inquiry location detection section 18a of inquiry equipment 18 after arboret tree trimming as shown in drawing 6, and making cut equipment 2 overrun, and making it run the self-propelled car 10 on mine Hara, a mine-disposal activity also becomes easy.

[Translation done.]

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation of the arboret tree trimming machine in which one gestalt of operation of this invention is shown.

[Drawing 2] It is the top view showing the activity range of an arboret tree trimming machine.

[Drawing 3] It is the block diagram showing the configuration of a controller.

[Drawing 4] It is the flow chart showing the work habits of an arboret tree trimming machine.

[Drawing 5] It is the side elevation of the cut equipment part of the arboret tree trimming machine in which the gestalt of other operations of this invention is shown.

[Drawing 6] It is the explanatory view of the condition at the time of a mine inquiry activity.

[Description of Notations]

- 1 Arboret Tree Trimming Machine
- 2 Cut Equipment
- 3 Motor
- 4 Blade
- 5 Infestation Device
- 6 Elevator Style
- 7 Position Transducer
- 8 Controller
- 9 Receiver
- 10 Self-propelled Car
- 11 Boom
- 12 Tire
- 13 Tire
- 14 Front-Wheel Side Frame
- 15 Rear Wheel Side Frame
- 16 Driver's Cabin
- 17 Motor Unit
- 18 Inquiry Equipment
- 18a Detection section
- 18b Defense box
- 18c Receipt device
- 19 Inquiry Data Transmitter
- 31 Motor RRC Solenoid
- 32 Motor RLC Solenoid
- 41 Solenoid for Advance
- 42 Solenoid for Go-astern
- 51 Right Slide Solenoid
- 52 Left Slide Solenoid

61 Top Slide Solenoid
62 Bottom Slide Solenoid
81 Input Section
82 Data-Processing Section
83 Storage Section
84 Output Section

[Translation done.]

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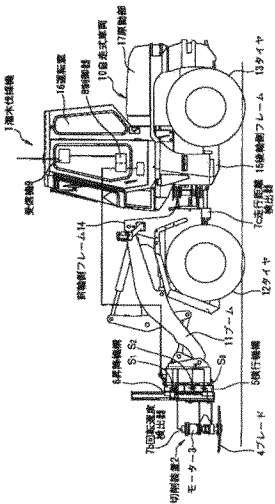
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(21)出願番号 特願2000-239284(P2000-239284) (71)出願人 000165974
古河機械金属株式会社
東京都千代田区丸の内2丁目6番1号
(22)出願日 平成12年8月8日(2000. 8. 8) (72)発明者 河内 昶
群馬県高崎市下和田町2-6-10
(74)代理人 100066980
弁理士 森 哲也 (外3名)

(54)【発明の名称】 灌木伐採機

(57)【要約】
【課題】 灌木伐採機を遠隔操作して危険な場所での灌木伐採を安全に行う。
【解決手段】 自走式車両10の前方に切削装置2を備えた灌木伐採機1において、切削装置2を左右方向に移動させる横行機構5と、切削装置2を上下方向に移動させる昇降機構6と、切削装置2の位置を検出する位置検出器7aと、切削装置2の回転速度を検出する回転速度検出器7bと、自走式車両10の走行距離を検出する走行距離検出器7cと、自走式車両10から離れた位置から送信される操作信号を受信する受信機9と、検出器7a、7b、7cの各検出データ及び受信機9で受信された操作信号に基づいて、横行機構5、昇降機構6、切削装置2、及び自走式車両10の走行装置の作動を制御する制御器8とを設ける。



(2) 開2002-51649 (P2002-5ch!A)

【特許請求の範囲】

【請求項1】 自走式車両の前方に切削装置を備えた灌木伐採機であって、切削装置を左右方向に移動させる横行機構と、切削装置を上下方向に移動させる昇降機構と、切削装置の位置を検出する位置検出器と、切削装置の回転速度を検出する回転速度検出器と、自走式車両の走行距離を検出する走行距離検出器と、自走式車両から離れた位置から送信される操作信号を受信する受信機と、位置検出器、回転速度検出器、走行距離検出器の各検出データ及び受信機により受信された操作信号に基づいて、横行機構、昇降機構、切削装置、及び自走式車両の走行装置の作動を制御する制御器とを設けたことを特徴とする灌木伐採機。

【請求項2】 切削装置の後方に装着された埋設地雷を探索する探索装置と、探索データを自走式車両から離れた位置へ送信する探索データ送信機とを備えたことを特徴とする請求項1記載の灌木伐採機。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、例えば地雷原のような危険な場所に茂った灌木を伐採するための灌木伐採機に関する。

【0002】

【従来の技術】 従来、地中に埋設された地雷を除去する作業は、埋設地雷を探索機で探索し、探知された地雷を手手で爆破処理するという手順で行われてきた。しかし、地雷原が熱帯雨林地帯にあるような場合には、地雷原の大部分が深い灌木に覆われていて、探索機による探索が困難なため、まず、灌木を伐採することが必要であった。ところが、地雷が埋設されたままの地雷原での灌木の伐採は危険を伴う上、地雷以外に蚊や蟻などの有害な動植物の障害もあり、伐採は極めて困難である。

【0003】 そこで、近年バックホウ等の掘削機で使用する起伏・屈折自在なアームの先端にロータリーカッターを取付けた灌木伐採機が提案されている（特開平8-320199号公報、特開平11-183095号公報参照）。

【0004】

【発明が解決しようとする課題】 しかしながら、この灌木伐採機は、起伏・屈折自在なアームを用いているのでロータリーカッターの複雑な動きが可能である反面、これを遠隔操作しようとする制御が複雑になり、遠隔操作は困難である。従って、オペレータが車両に搭乗して操作する必要がある。

【0005】 このような灌木伐採機は、地雷原では埋設地雷を探索する前に使用されるため、爆発力の小さい対人地雷だけでなく強烈な爆発力を有する対戦車地雷に触れるおそれが大であり、搭乗しているオペレータにとって極めて危険である。本発明は、従来の灌木伐採機における上記問題を解決するものであって、離れた位置から

簡単に遠隔操作することのできる灌木伐採機を提供することを目的とする。

【0006】

【課題を解決するための手段】 本発明の灌木伐採機は、自走式車両の前方に切削装置を備えた灌木伐採機であって、切削装置を左右方向に移動させる横行機構と、切削装置を上下方向に移動させる昇降機構と、切削装置の位置を検出する位置検出器と、切削装置の回転速度を検出する回転速度検出器と、自走式車両の走行距離を検出する走行距離検出器と、自走式車両から離れた位置から送信される操作信号を受信する受信機と、位置検出器、回転速度検出器、走行距離検出器の各検出データ及び受信機により受信された操作信号に基づいて、横行機構、昇降機構、切削装置、及び自走式車両の走行装置の作動を制御する制御器とを設けることにより上記課題を解決している。

【0007】 地雷原等の危険な場所で灌木伐採作業を行う場合には、灌木伐採機から離れた安全な位置から作動開始の操作信号を送る。すると、受信機により受信された操作信号に基づいて、制御器が灌木伐採機の作動を開始させる。作業中は、位置検出器が切削装置の位置を検出し、回転速度検出器が切削装置の回転速度を検出し、走行距離検出器が自走式車両の走行距離を検出し、制御器が位置検出器、回転速度検出器、走行距離検出器の各検出データに基づいて、昇降機構、横行機構、切削装置、及び自走式車両の走行装置の作動を制御し、自走式車両の前方で切削装置を所定の伐採幅に亘って移動させ自走式車両を前進させながら灌木の伐採を行う。

【0008】 即ち、作動開始の操作信号を受けた制御装置は、まず昇降機構を作動させ、切削装置を所定の高さにセットする。次に切削装置のカッターを回転させ、横行機構により切削装置を横行させる。切削装置が右端、又は左端まで移動すると自走式車両を所定距離前進させ、切削装置を逆方向へ横行させる。必要な範囲の灌木伐採が終了したら、灌木伐採機から離れた安全な位置から作動停止の操作信号を送れば、受信機により受信された操作信号に基づいて、制御器が灌木伐採機の作動を停止させる。

【0009】 この灌木伐採機は、遠隔操作時の制御が簡単であり、オペレータは安全な位置から作動開始と作動停止の操作信号を送るだけで灌木伐採作業を行うことができる。切削装置の後方に埋設地雷を探索する探索装置を装着し、探索データを自走式車両から離れた位置へ送信する探索データ送信機を設けると、灌木伐採後に灌木伐採機を用いて埋設地雷の探索を行うことができるので、地雷処理作業も容易になる。

【0010】

【発明の実施の形態】 図1は本発明の実施の一形態を示す灌木伐採機の側面図、図2は灌木伐採機の作業範囲を示す平面図、図3は制御器の構成を示すブロック図、図

(3) 開2002-51649 (P2002-5ch) 暖機

4は灌木伐採機の作業手順を示す流れ図である。ここで、灌木伐採機1の本体は、タイヤ12を設けた前輪側フレーム14とタイヤ13を設けた後輪側フレーム15とを中央部で左右に屈曲可能に連結したアーティキュレートタイプの自走式車両10であって、その前輪側フレーム14には起伏可能なブーム11が設けられており、このブーム11の先端部に切削装置2が取付けられている。後輪側フレーム15には、運転室16と原動部17とが設けられている。なお、自走式車両には、クローラタイプ等他の形式の車両を用いることもできる。

【0011】切削装置2は、回転駆動機構であるモーター3と、モーター3に連結して装着されたブレード4とで構成されており、横行機構5と昇降機構6とを介してブーム11の先端部に支持され、左右方向及び上下方向に移動可能になっている。切削装置2のカッターとして、ここではブレード4を用いているが、伐採する対象に合わせてチェーンソー等他の形式のカッターを用いることもできる。

【0012】横行機構5と昇降機構6とは、図示しない油圧シリンダによって切削装置2を左右方向及び上下方向にスライドさせるように構成されている。横行機構5の油圧シリンダは、右スライドソレノイド51と左スライドソレノイド52とで切換えられるソレノイドバルブで制御され、昇降機構6の油圧シリンダは、上スライドソレノイド61とフロートソレノイド62とで切換えられるソレノイドバルブで制御される。モーター3は、モーター右回転ソレノイド31とモーター左回転ソレノイド32とで切換えられるソレノイドバルブで制御される。自走式車両の走行装置は、前進用ソレノイド41と後進用ソレノイド42で切換えられるソレノイドバルブで制御される。

【0013】なお、横行機構5と昇降機構6の駆動手段には、油圧シリンダに代えて空気圧シリンダや電動モータ等を使用することもできる。横行機構5及び昇降機構6には、切削装置2の位置を検出するための位置検出器7aが設けられている。この位置検出器7aは切削装置2の上端、指定切削高さ、下端を検出するよう昇降機構6に配置された近接スイッチ S_1 、 S_2 、 S_3 と、切削装置2の左端、右端を検出するよう横行機構5に配置された近接スイッチ S_4 、 S_5 とで構成されている。なお、位置検出器7には、近接スイッチの他、リミットスイッチ、ロータリエンコーダ、ポテンショメータ等他のセンサを用いることもできる。

【0014】切削装置2には、ブレード4の回転速度を検出するための回転速度検出器7bが設けられている。この回転速度検出器7bは、モーター3の回転速度を電気信号に変換する回転センサーで構成されている。自走式車両10には、走行距離を検出するための走行距離検出器7cが設けられている。この走行距離検出器7cは、ミッション出力軸の回転速度を電気信号に変換する

回転センサーで構成されている。

【0015】この灌木伐採機1には、自走式車両10から離れた位置から送信される操作信号を受信する受信機9と、切削装置2と横行機構5と昇降機構6と自走式車両10の走行装置の作動を制御する制御器8が設けられており、位置検出器7a、回転速度検出器7b、走行距離検出器7cの各検出データと受信機9により受信された操作信号はこの制御器8に送られる。

【0016】制御器8は、図3に示すように、入力部81、演算処理部82、記憶部83、出力部84を備えたマイクロプロセッシングユニット(MPU)であり、受信機9によって受信された操作信号と位置検出器7の検出データに基づいて、モーター右回転ソレノイド31、モーター左回転ソレノイド32、右スライドソレノイド51、左スライドソレノイド52、上スライドソレノイド61、下スライドソレノイド62、前進用ソレノイド41、後進用ソレノイド42に制御信号を送って、モーター3と横行機構5と昇降機構6と自走式車両10の走行装置のソレノイドバルブ(図示略)の切換えを行うことにより、その作動を制御する。

【0017】灌木伐採機1により地雷原の灌木伐採を行う場合の作業手順を図4により説明する。まず、地雷の爆発により人体に被害が及ばない安全な位置から、遠隔操作器(図示略)を用いて作動開始の操作信号を送る。すると、受信機9により受信された操作信号は制御器8に送られる。制御器8は切削装置2の位置が左端にあることを近接スイッチ S_4 からの信号がonであることにより確認する。もし左端にないときには、制御器8から左スライドソレノイド52にon信号を出力し、切削装置2を左端に移動させる。

【0018】次に、制御器8は切削装置2の位置が予め設定された指定切削高さにあることを近接スイッチ S_2 からの信号がonであることにより確認する。もし切削装置2が指定切削高さにないときには、制御器8から下スライドソレノイド62にon信号を出力し、切削装置2を下方に移動させる。切削装置2が指定切削高さより高い位置にあれば、下方に移動した切削装置2は指定切削高さに達して近接スイッチ S_2 がonとなる。切削装置2が指定切削高さより低い位置にあれば、下方に移動した切削装置2は下端に達して近接スイッチ S_3 がonとなり、制御器8から下スライドソレノイド62にoff信号を出力すると共に上スライドソレノイド62にon信号を出力し、切削装置2を上方に移動させるので、切削装置2は指定切削高さに達して近接スイッチ S_2 がonとなる。

【0019】近接スイッチ S_2 がonになると、下スライドソレノイド62、または上スライドソレノイド62にoff信号が送られて、切削装置2は指定切削高さで停止し、その高さで保持される。それから、制御器8は、モーター右回転ソレノイド31にon信号を出力し、切削装置2のモーター3を右回転させる。モーター回転速度が

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予め設定された上限回転速度 N_1 以上になると、回転速度検出器7bがonとなり、制御器8は右スライドソレノイド51にon信号を出力するので、切削装置2はブレード4の回転で灌木を伐採しながら右側へ移動する。

【0020】切削抵抗でモーター回転速度が予め設定された下限回転速度 N_2 以下になると、回転速度検出器7bがoffとなり、制御器8は右スライドソレノイド51にoff信号を出力するので、切削装置2の右側への移動が停止する。右側への移動が停止すると、切削抵抗がなくなるため回転速度が増加する。再び上限回転速度 N_1 以上となれば、回転速度検出器7bが再びonとなり、制御器8は右スライドソレノイド51にon信号を出力するので、切削装置2は右側への移動を再開する。

【0021】切削装置2が右端に達すると、近接スイッチ S_6 がonとなり、制御器8は右スライドソレノイド51にoff信号を出力すると共に、モーター右回転ソレノイド31にoff信号を出力し、モーター左回転ソレノイド32にon信号を出力する。モーター3の逆転は、強度上問題ない回転で行われるようになっている。モーター回転速度が上限回転速度 N_1 以上になると、回転速度検出器7bがonとなり、制御器8は前進用ソレノイド41にon信号を出力するので、切削装置2のブレード4の回転で灌木を伐採しながら自走式車両10が前進する。モーター3の回転速度の変化で前進と停止とを繰り返すのは右側への移動の場合と同様である。

【0022】予め設定された距離だけ走行すると、走行距離検出器7cがonとなり、制御器8は前進用ソレノイド41にoff信号を出力するので、自走式車両10は前進を停止する。モーター回転速度が上限回転速度 N_1 以上になると、回転速度検出器7bがonとなり、制御器8は左スライドソレノイド52にon信号を出力するので、切削装置2はブレード4の回転で灌木を伐採しながら左側へ移動する。

【0023】切削装置2が左端に達すると、右端の場合と同様に自走式車両10を前進させた後、再度上記の作業を繰り返す。このようにして灌木伐採機1は、灌木伐採範囲A内の灌木の伐採作業を自動的に行うことができる。灌木伐採が終了したら、灌木伐採機1から離れた安全な位置から遠隔操作器を用いて作動停止の操作信号を送れば、受信機9により受信された操作信号に基づいて、制御器8が灌木伐採機1の作動を停止させる。

【0024】ここで、モーター3の回転方向は、ブレード4の進行方向へ灌木を引き寄せるように、右移動のときは右回転、左移動のときは左回転、右端前進のときは左回転、左端前進のときは右回転とするように構成されているが、地雷原で使用する場合は、地雷を自走式車両10の方向へ呼び込むおそれがあるため、回転方向を逆に構成することもある。

【0025】図5は本発明の他の実施の形態を示す灌木伐採機の切削装置部分の側面図、図6は地雷探査作業時

の状態の説明図である。この灌木伐採機1の切削装置2の後方には、埋設地雷を探査する探査装置18が装着されており、その探査データを自走式車両10から離れた位置へ送信する探査データ送信機19が昇降機構6の上端部に設けられている。

【0026】探査装置18は、検知部18aと、検知部18aを収納して防御するための防御箱18bと、検知部18aを探査位置から収納位置まで移動させるための収納機構18cとで構成されている。この灌木伐採機1は、灌木伐採後に探査装置18の検知部18aを図6に示すように探査位置とし、切削装置2を横行させ、自走式車両10を地雷原上で走行させることにより、効率良く地雷の探査を行うことができるので、地雷処理作業も容易になる。

【0027】

【発明の効果】以上説明したように、本発明の灌木伐採機は、制御が自動化されており、離れた位置から簡単に遠隔操作することができるので、地雷原等の危険な場所での灌木伐採作業を安全に行うことができる。また、切削装置の後方に埋設地雷を探査する探査装置を装着し、探査データを自走式車両から離れた位置へ送信する探査データ送信機を設けると、灌木伐採後に灌木伐採機を用いて埋設地雷の探査も遠隔操作により安全に行うことができるので、地雷処理作業が容易になる。

【図面の簡単な説明】

【図1】本発明の実施の一形態を示す灌木伐採機の側面図である。

【図2】灌木伐採機の作業範囲を示す平面図である。

【図3】制御器の構成を示すブロック図である。

【図4】灌木伐採機の作業手順を示す流れ図である。

【図5】本発明の他の実施の形態を示す灌木伐採機の切削装置部分の側面図である。

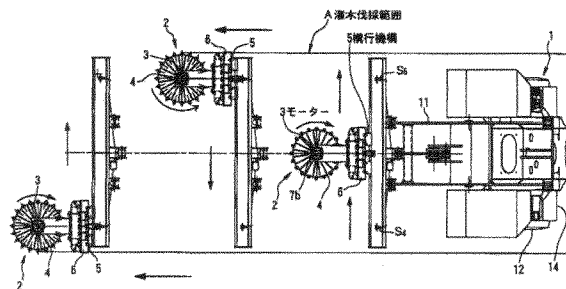
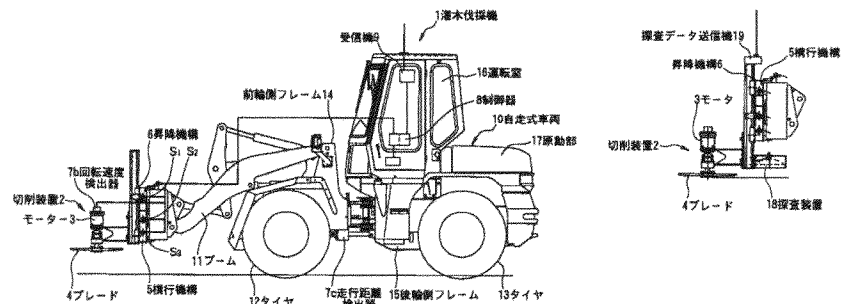
【図6】地雷探査作業時の状態の説明図である。

【符号の説明】

- 1 灌木伐採機
- 2 切削装置
- 3 モーター
- 4 ブレード
- 5 横行機構
- 6 昇降機構
- 7 位置検出器
- 8 制御器
- 9 受信機
- 10 自走式車両
- 11 ブーム
- 12 タイヤ
- 13 タイヤ
- 14 前輪側フレーム
- 15 後輪側フレーム
- 16 運転室

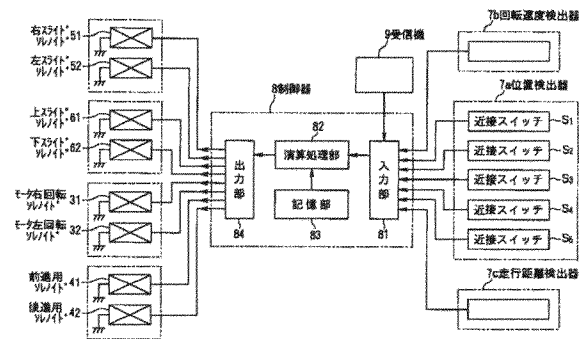
- | | | | |
|-------|--------------|-----|------------|
| 1 7 | 原動部 | 4 2 | 後進用ソレノイド |
| 1 8 | 探査装置 | 5 1 | 右スライドソレノイド |
| 1 8 a | 検知部 | 5 2 | 左スライドソレノイド |
| 1 8 b | 防御箱 | 6 1 | 上スライドソレノイド |
| 1 8 c | 収納機構 | 6 2 | 下スライドソレノイド |
| 1 9 | 探査データ送信機 | 8 1 | 入力部 |
| 3 1 | モーター右回転ソレノイド | 8 2 | 演算処理部 |
| 3 2 | モーター左回転ソレノイド | 8 3 | 記憶部 |
| 4 1 | 前進用ソレノイド | 8 4 | 出力部 |

【图5】



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【図3】



【図6】

